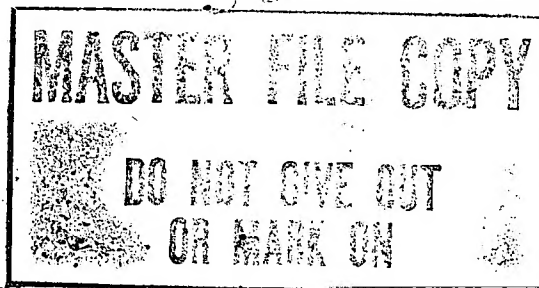




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25X1

A Compilation of Soviet Ryad Mainframe and SM Small-Computer Equipment

25X1

A Reference Aid

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A COMPILATION OF SOVIET RYAD MAINFRAME AND SM SMALL-COMPUTER EQUIPMENT

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Information available as of May 1985 was used in this report.

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This paper was prepared by [redacted]
[redacted] Office of Scientific and Weapons Research. Comments and queries
are welcome and may be directed to the Chief, Information Technologies Branch,
OSWR [redacted]

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PREFACE

The purpose of this guide is to provide a quick and easy reference to the equipment that comprises the Soviet/East European Ryad mainframe and SM small-computer systems, as well as a concise presentation of important technical information. This reference aid is divided into two main sections: the first covers Ryad or Edinaya Sistema (unified system; ES or YeS) mainframe equipment and the second covers the small-computer (SM) systems. The appendix contains examples of typical system configurations and performance information. A glossary of abbreviations is provided at the end of the paper. [REDACTED]

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The presence of specific equipment in this nomenclature listing does not necessarily imply a technology or a production capability. This reference aid compiles information from a variety of publications. In those cases where we obtained conflicting data on the operational parameters of indigenous Soviet computer systems, we used our best engineering judgment to select the most likely operational values. [REDACTED]

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Memory storage in this publication is specified in powers of 2 (for example, 2 raised to the tenth power is 1,024, which is equivalent to 1K of memory). Memory storage units may be expressed in bits, bytes, or words; they are defined in the glossary. In general, communications or data transfer rates are specified in powers of 10. Telecommunication rates usually are expressed in the number of bits per second, whereas computer transfer rates typically are given in the number of bytes per second. Sometimes telecommunication data rates are expressed in bauds, where a baud is the shortest signal element of a communication system. At low speeds, such as 300 bauds (per second), a baud is equal to a bit or binary digit of information. At higher speeds a baud may contain multiple bits of information. For example, many 9600 bits per second data communication systems actually transmit at 2400 bauds; here, each baud contains four bits of information in its signal structure. [REDACTED]

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A COMPILATION OF SOVIET RYAD MAINFRAME AND SM SMALL-COMPUTER EQUIPMENT

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INTRODUCTION

In 1967 the Soviets made a major decision to develop a family of mainframe computers by copying the architecture of the commercially successful IBM System/360. By the end of 1969, the Soviets had convinced most of their East European allies in the Council for Mutual Economic Assistance (CEMA) to join this effort--called Ryad-1 (series), or Edinaya Sistema (unified system; ES or YeS). The USSR concentrated on high-performance systems, while its CEMA partners were to put their resources into low-end mainframes and peripheral equipment. For the most part, the CEMA countries adapted the IBM designs to their indigenous electronic base; thus, their hardware was not exact duplicates of their IBM counterparts. By copying IBM's logical architecture, the CEMA countries are able to use directly the large Western repository of IBM-compatible software--as is true with Western and Japanese companies that produce IBM "plug-compatible" equipment. [REDACTED]

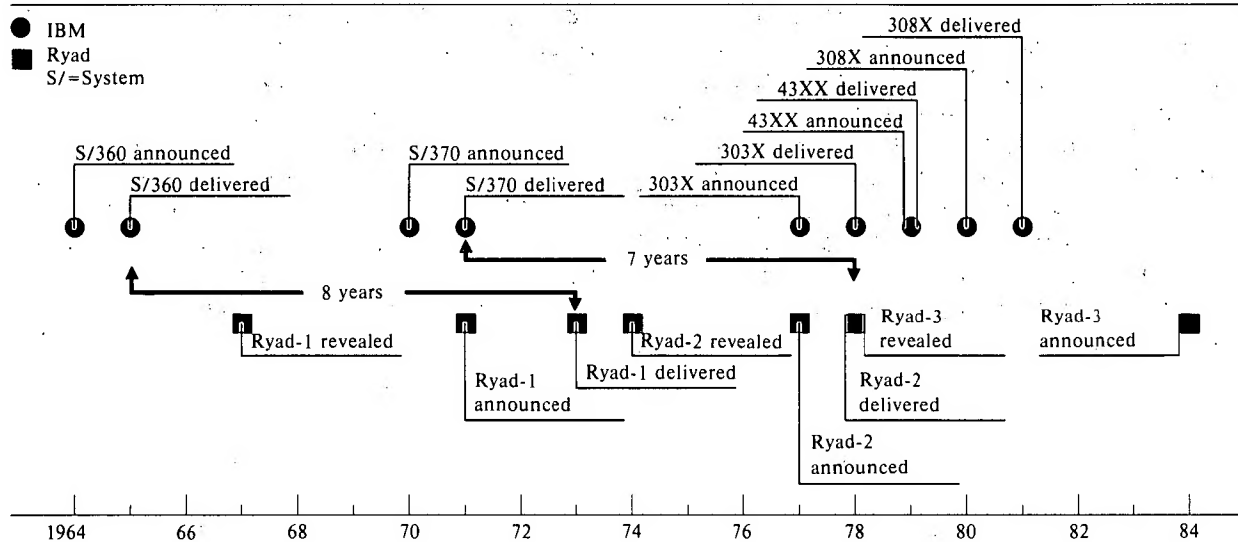
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Initially, the Ryad-1 family consisted of models 1010, 1020, 1021, 1030, 1040, 1050, and 1060. The Hungarian 1010 is a 16-bit minicomputer that is modeled after the French Mitra-15. The 1021 is a low-performance Czech mainframe combining some attributes of the System/360 line with those of the Czech ZPA-6000/20 computer. Neither the 1010 nor the 1021 are software-compatible with IBM nor with the rest of the Ryad-1 line. The first Soviet Ryad-1 model, the 1020, was displayed in 1971; however, it was mid-1973 before most of the other models were displayed (see figure 1). The 1030 and 1050 were also Soviet projects, while the 1040 was developed and produced in the German Democratic Republic (GDR). The high-performance 1050 and 1060 Soviet computers, which used new high-speed, emitter-coupled logic, encountered many problems in development. The problems of the 1060 were serious enough to cause the system to be deferred until the subsequent Ryad-2 generation. [REDACTED]

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Figure 1
Timetable: IBM and Soviet Ryad Mainframes, 1964-84



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[REDACTED]

Ryad-1 was soon followed by interim Ryad-1 system upgrades. Hungary produced the 1011 and 1012 models. The USSR made three improved versions: the 1022 from the 1020, the 1033 from the 1030, and the 1052 from the 1050. The Bulgarians were licensed by the Soviets to build the 1020 and the 1022. Poland developed the 1032, based on the 1030 model. [REDACTED]

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As production of these intermediate Ryad-1 models began, the second generation of Ryad computers was being developed--based upon the IBM System 370. The Soviets' first Ryad-2 computer, the 1035, was introduced in 1978. The Soviets eventually licensed this machine to the Bulgarians. Other Soviet Ryad-2 models include: the 1045, the 1060, and the 1065. Czechoslovakia modified its original Ryad-2 contribution, the 1025, into the 1025M, and subsequently the 1026. East Germany similarly evolved its Ryad-2 models through the 1055, 1055M, and finally the 1056. The Hungarian Ryad-2, the 1015, probably entered very low production around 1983. An improved Soviet 1060, the 1061, was first mentioned in 1982, and probably entered production about two years later. [REDACTED]

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In November 1981 the Soviets announced the 1036, and in 1984 the 1036 was described by the Soviets as their first member of the long-awaited Ryad-3 family. The 1036 may be modeled after an early IBM-43XX machine. Other Ryad-3 computers mentioned in the literature include: the Czech ES-1027, the Polish ES-1034, the Soviet ES-1037, and the East German ES-1057. [REDACTED]

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In 1974 the CEMA countries held a special conference to discuss a project similar to Ryad, involving minicomputers called the international system of small computers. Four small systems (Sistema Malykh, SM) were developed initially in the USSR: the SM-1, SM-2, SM-3, and SM-4. The SM-1 and SM-2 are variations of the Hewlett-Packard HP-2100 series (see figure 2) of minicomputers. Modifications by the Soviets of the basic HP-2100 design in developing the SM-1 and SM-2 have made the software of these SM systems incompatible with HP software. The SM-3, the Soviet adaptation of the DEC PDP-11/05, and the SM-4, the Soviet version of the PDP-11/34, appear to have been copied scrupulously and are believed to be directly compatible with DEC software. [redacted]

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About 1979, CEMA countries began coordinating the second generation of SM small computers, SM-2--both minicomputers and microcomputers. CEMA has adopted a new nomenclature for this next generation:

- o SM-50: General-purpose microcomputers for applications such as control and communications.
- o SM-51: Small computers maintaining software compatibility with the SM-1 series.
- o SM-52: High-performance, real-time small computers; this class will eventually include high-performance, 32-bit superminicomputers.
- o SM-53: Multiprocessors and multimachine systems.
- o SM-54: Special processors for character recognition, fast Fourier transforms, and other specialized applications.

At least 20 CEMA systems using this nomenclature have been identified. Many of these are still under development; others are simply a new designator for an existing system. New Soviet minicomputers, the SM-5 and the SM-1420 (probably the same machine), were introduced in about 1983 and are expected to follow the DEC PDP-11 architecture. [redacted]

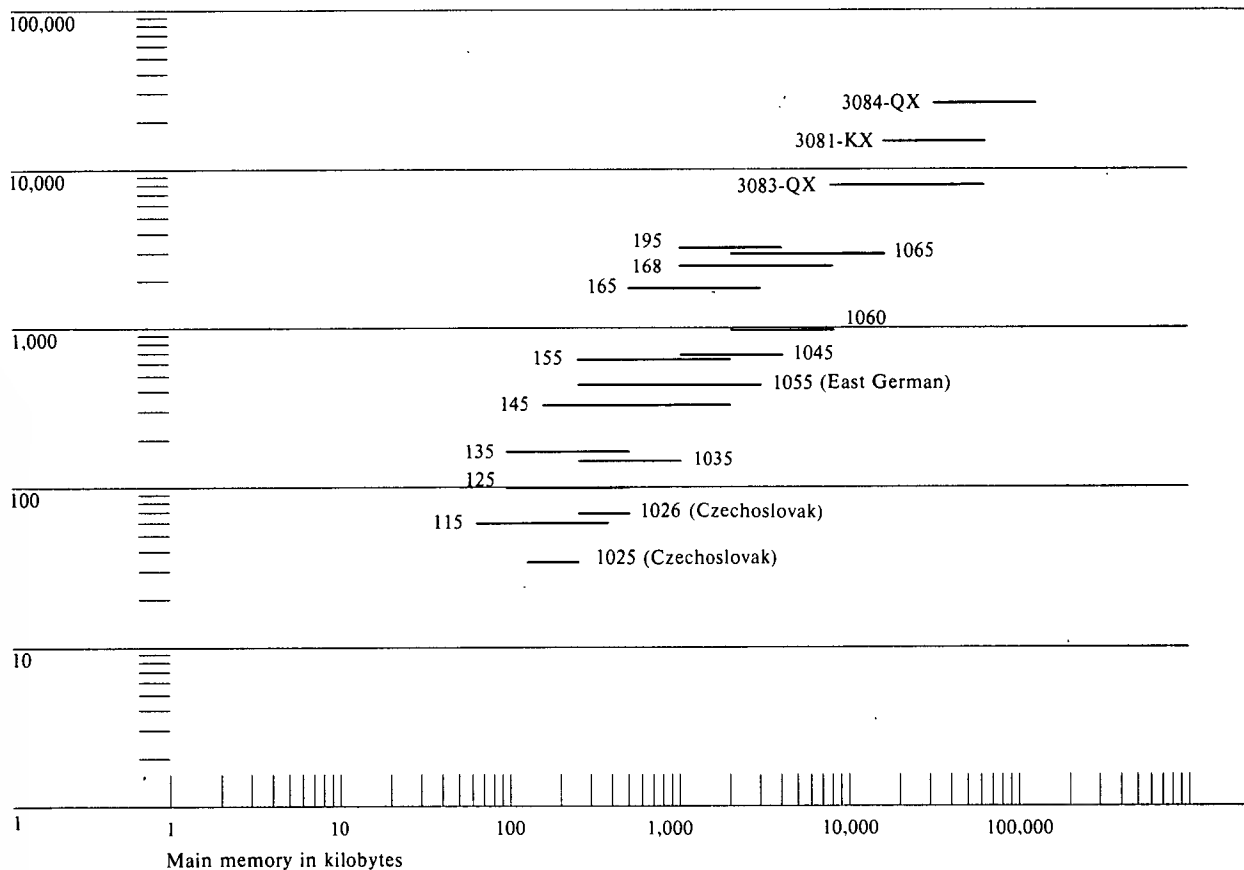
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Figure 2
Mainframe Performance: United States and Soviet Bloc

Thousands of operations per second

— IBM
— Ryad



ES LISTING

COMPONENT LISTING FOR RYAD OR EDINAYA SISTEMA (ES) MAINFRAME COMPUTERS
(All equipment designators preceded by ES unless otherwise specified.)

In those cases where we obtained conflicting data on the operational parameters of indigenous Soviet computer systems, we used our best engineering judgment to select the most likely operational values.

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KEYBOARDS(?): 01XX

0101 CSSR c.1972, Hungary c.1973; contactless A/N keyboard; min 96 chars:
 0101-1-01 Operator's desk, contactless keyboard;
 0101-1-02 Cyrillic alphabet data acquisition, contactless keyboard;
 0101-1-03 Cyrillic alphabet typewriter, contactless keyboard;
 0101-1-04 General purpose, Latin alphabet, contactless keyboard
 0102 Hungary c.1972, CSSR c.1974; numeric keyboard up to 25 char/s

STATIONARY POWER SUPPLIES: 08XX

0823 Power supply for 1022
 0824 Power supply for 1060
 0825 Power supply for 1060
 0835 Power supply for 1035
 0836 Power supply for 1036
 0853 Power switching device

MOBILE POWER SUPPLIES: 09XX

0904 Power pack for mag tape ctrl; +5 volts; 18 amps; also referred to as BP-1
 0905 Power pack for mag tape ctrl; +5 volts (BP-2), -5 volts BP-3); 3.6 amps

COMPUTER SYSTEMS: 10XX

1010 Ryad-1 Hungary c.1972; 16-bit mini; 3 kOPS; 8 - 64 KB; upgm ctl; TTL; modeled after US SDS Sigma-5 & French CII Mitra-15; Videoton produced "several hundred configurations"
 1010V Ryad-1M Hungary; ctl computer system
 1010M Ryad-1M Hungary; 1010 with 64 KB main memory; possibly exported to France
 1011 Ryad-1M Hungary c.1978; 16- or 32-bit modes; 512 KB; possibly used by military and possibly exported to France
 1012 Ryad-1M Hungary c.1975; 6 kOPS; 128 KB; xpan inst set; few produced
 1015 Ryad-2 Hungary c.1979; 12 - 16 kOPS; 160 KB; 16 MB VS
 1016 Ryad-2? Hungary c.1983; 15-20 kOPS; 512 kB main memory; 16 MB virtual memory; ES/DOS-3; 29 MB disks; dev completed 1983
 1017 Ryad-? Hungary; expected around mid-1980s
 1020 Ryad-1 USSR c.1972, Bulgaria; 10-20 kOPS; 64-256 KB; TTL; upgm ctl; 2 us cycle time
 1020A Ryad-1 CSSR; same as 1021
 1021 Ryad-1 CSSR c.1972; 20 kOPS; 16-24 KB; 1 us access 2 us cycle time
 1021M Ryad-1 CSSR 1020; 16-64 KB; "not compatible" with Ryad-1
 1022 Ryad-1M USSR c.1975; 80-90 kOPS; 128-512 KB; TTL; 600 ns cycle time; upgm ctl
 1022B Ryad-1M Bulgaria; 80 kOPS; 512 KB; under Soviet "license"
 1025 Ryad-2 CSSR c.1979; 30-40 kOPS; 256 KB; 8 MHz clock; 102 instruction set; 1.25 us cycle time; multiprogram operation

ES LISTING

1025M	Ryad-2	CSSR c.1981
1026	Ryad-2	CSSR c.1983; 36-52 kOPS; 128-512 kB main memory
1027	Ryad-3	CSSR c.1985; 400 kOPS; max 2 MB (4 MB in 1987); 8 KB cache; to use Czech 16 Kbit DRAMs
1030	Ryad-1	USSR c.1972, Poland; 60 kOPS; 128-512 KB; TTL; upgm ctl
1032	Ryad-1M	Poland c.1976; 200 kOPS; 256-512 KB
1033	Ryad-1M	USSR c.1977; 200 kOPS; 256-512 KB; 1.2 us cycle time; 200 kB/s xfer rate; real-time & time-sharing operation; upgm ctl
1034	Ryad-3	Poland c.1987?; up to 4 MB main memory; up to 8 I/O channels
1035	Ryad-2	USSR c.1977; 140 kOPS; 512 KB; 2 us cycle time; time-sharing & real-time operation; compatible with Minsk-32
1035.01	Ryad-2	ES-1035 with semiconductor main memory
1035.03	Ryad-2	Bulgaria
1035.21	Ryad-2	Bulgaria
1036	Ryad-3	USSR c.1984, Bulgaria?; 400 kOPS; 2-4 MB main memory w/cache; introduces virtual machine operating system
1037	Ryad-3	USSR c.1985; Bulgaria?; 500 kOPS; max 4 MB main memory
1040	Ryad-1	GDR c.1973; 380 kOPS; 128-1024 KB; TTL; 1.35 us cycle time; upgm ctl
1045	Ryad-2	USSR c.1980, Poland?; 500 kOPS; up to 3 MB magnetic core main memory; 1.2 us cycle time; 1500 kB/s xfer rate
1045.01	Ryad-2	ES-1045 with semiconductor main memory
1046	Ryad-3?	USSR c.1985; 1 MOPS; 4-6 MB main memory
1047	Ryad-3?	USSR
1050	Ryad-1	USSR c.1973; 500 kOPS; 128-1024 KB; hard-wired ctl; time-sharing & real-time operation; 1.25 us cycle time; uses ECL logic series 137 & 187
1052	Ryad-1M	USSR c.1978; 700 kOPS; 2048 KB
1055	Ryad-2	GDR c.1978; 450-750 kOPS with cache; 2 MB; time-sharing & real-time operation; 1.2 us cycle time
1055M	Ryad-2	GDR c.1981; 450 kOPS; 4 MB
1056	Ryad-2	GDR c.1983
1057	Ryad-3?	GDR c.1985-1986?
1060	Ryad-2	USSR c.1978; 1.3 MOPS; 2 MB; 8 MB VS; hard-wired ctl; 1.0 us cycle time; time-sharing & real-time operation; 1500 kB/s xfer rate; uses series 137 & 187 ECL circuits
1061	Ryad-2	USSR c.1984; 0.5-2.0 MOPS; 1-8 MB main memory; 16MB virtual storage; 128-bit floating point capability
1065	Ryad-2	USSR c.1983; 3 - 3.5 MOPS per processor; max 2 processors; time-sharing & real-time operation; 1500 kB/s xfer rate

OPERATOR CONSOLES: 15XX

1501	Control panel for 1060
1535	Control panel for 1035 & 1045

PROCESSORS: 2XXXPROCESSORS WITHOUT MAIN MEMORY AND WITHOUT CHANNELS: 20XX

2010	Hungary; processor for 1010; 18-bit word with 16 info bits; upgm ctl
2020	USSR, Bulgaria; processor for 1020; 20-30 us per short operation; upgm ctl; 1-byte ALU
2021	CSSR; processor for 1021

ES LISTING

2030 USSR; processor for 1030; 5-11 us per short operation; upgm ctl;
4-byte ALU
2032 Poland; processor for 1032; 300 ns machine cycle time; 2.4 us per
short operation
2040 GDR; processor for 1040; 1.4-2 us per short operation; upgm ctl
2050 USSR; processor for 1050; 0.65 us per short operation
2060 USSR; processor for 1060; 50-90 ns cycle time
2127 CSSR; CPU for 1027; 8 KB cache; 400 kOPS

PROCESSORS WITH MAIN MEMORY BUT WITHOUT CHANNELS: 23XX

2335 Bulgaria; array processor for 1035; 200 ns cycle time
2345 USSR; array processor for 1045
2361 CPU for 1061; contains up to 8 MB memory

PROCESSORS WITH CHANNELS BUT WITHOUT MAIN MEMORY: 24XX

2422 CPU with 1 mux & 2 selector channels
2433 CPU for 1033 with 1 mux & 3 selector channels; works with 3203 main
store; 1.5 us cycle time; 256-512 KB; upgm ctl
2435 CPU with 1 mux & 2 selector channels
2436 CPU for ES-1036

PROCESSORS WITH MAIN MEMORY AND WITH CHANNELS: 26XX

2600 USSR c.1985; interpretive processor; 200 kOPS; 64-256 KB main memory
2622 USSR; central unit for 1022 consisting of 2422, 3222, & 0823;
upgm ctl; 2-byte ALU
2635 USSR; Bulgaria; central unit for 1035; consists of 2435, 3235 or 3237,
1535, 5009, & 0835; upgm ctl; 2-byte ALU
2640 GDR; central unit for 1040; upgm ctl & sequential ctl; 380 kOPS
2655 GDR; central unit for 1055; 450 kOPS
2655M GDR; central unit for 1055M
2703 USSR c.1984; "special" array processor
2705 USSR c.1984; "special" array processor
2706 USSR c.1984; matrix processor; 40 MOPS

INTERNAL MEMORY UNITS: 3XXX

MAIN MEMORY: 32XX

3203 USSR, Poland; core main store for 1030 & 1033; 256 KB rack consisting
of two 128 KB modules; 0.85 us access time; 1.5 us cycle time
3204 GDR; core main store for 1040; 1.35 us cycle time; 256-1024 KB
3205 USSR; core main store for 1050; 256 KB rack consisting of two 128 KB
modules; 0.8 us access time; 1.25 us cycle time
3206 Core main store for 1045, 1052, & 1060; 1 MB rack consisting of
sixteen 64 KB modules; 0.6 us access time
3207 Core main store for 1033; 512 KB rack consisting of eight 64 KB
modules (3941); 0.7 us access time; 1.2 us cycle time
3220 USSR; core main store for 1020; 256-512 KB; 2 us cycle time
3222 Core main store for 1022; 256-512 KB; 1 us access time
3235 Core main store for 1035; 256-1024 KB; 0.5 us access time; 0.8 us
cycle time; 3235 has been referenced as "semiconductor based"
3236 32 Kb memory board consisting of 1 Kb nMOS RAMs
3237 Core main store; 256 KB
3238 192 Kb memory board consisting of 48 4 Kb nMOS RAMs

ES LISTING

3263 Semiconductor memory for 1033; 256 KB; 1.5 us cycle time
3266 8 MB semiconductor memory consisting of four 2 MB blocks; 520 ns
access time; 680 ns cycle time
3267 Core main store for 1045; 1 MB rack; four racks/system; 1560 us cycle
time
3415 Memory device

MICROPROGRAM STORE CONTROLLERS: 35XX

3535 Control for upgm storage devices using 2435 CPU adapter

READ-ONLY MEMORIES: 36XX

3604 GDR; read-only memory for 1040

STORAGE MODULES: 39XX

3941 64 KB storage module

CHANNELS: 4XXX

MULTIPLEXER CHANNELS: 400X-402X

4001 General-purpose channel with 100 kB/s byte mux, 500 kB/s selector
channel & up to 3000 kB/s blk mux; used with 1060 & 1061
4011 GDR; mux chn for 1040 computer; 25 kB/s serial; 720 kB/s blk
4012 USSR; mux chn for large Ryad-1 computers; 670 kB/s xfer rate

SELECTOR CHANNELS: 403X-405X

4034 GDR; selector chn for GDR's 1040; 300-1300 kB/s xfer rate
4035 USSR; selector chn for large Ryad computers; 1300 kB/s

CHANNEL-CHANNEL ADAPTERS: 406X

4060 USSR; channel-to-channel adapter
4061 USSR; channel-to-channel adapter
4065 USSR; channel-to-channel adapter

REPEATERS: 407X-409X

4080 Logic repeater used in 1065
4081 Main line signal repeater of I/O interface

MULTIPLEXER AND SELECTOR CHANNELS: 44XX

4430 USSR, Poland; selector & mux chns for 1030; 40-800 kB/s xfer rate

EXTERNAL MAGNETIC MEMORY STORAGE: 5XXX

MAGNETIC TAPE DRIVES: 500X-502X

NOTE: All drives take 9 track, 25 MB capacity, ISO reels (267 mm diameter,
12.7 mm wide, 730 m long) unless otherwise noted

5001 Poland; magnetic tape storage; NRZI
5002.03 GDR c.1981; 96/189 kB/s; 32 or 63 b/mm linear density
5003 USSR, Bulgaria c.1983; 200 ips; 1600 bpi PE at 315 kB/s or 800 bpi NRZI
at 160 kB/s; not confirmed operational; do not confuse with ISOT 5003;
5003.03 Bulgaria c.1981; 120 ips; 1600 bpi PE at 189 kB/s or 800 bpi NRZI
at 96 kB/s

ES LISTING

5003.05 c.1984; 200/ips; 1600 bpi; 315 kB/s xfer rate
 5003.06 Bulgaria c.1984; 160/315 kB/s; 32/64 b/mm linear density
 5004 CSSR c.1976, Bulgaria?; 75 ips; 1600 bpi PE at 126 kB/s or 800 bpi NRZI at 64 kB/s; tape has 50 MB storage capacity
 5009 "Console magnetic tape unit"
 5010 USSR c.1971; magnetic tape store for 1020; 75 ips; 200 or 800 bpi NRZI up to 64 kB/s xfer rate
 5010.01 USSR c.1975; modernized 5010
 5012 USSR c.1971; 75 ips; 200 or 800 bpi NRZI at 16 or 64 kB/s
 5012.01 Bulgaria c.1971; 200 bpi at 16 kB/s or 800 bpi at 64 kB/s
 5012.03 Bulgaria; 120 ips; 800 bpi NRZI at 96 kB/s; modernized 5012.01
 5012.4 Bulgaria
 5014 USSR; 75 ips; 800 bpi or 1600 bpi PE at 126 kB/s
 5015 CSSR; 4 m/s; 800 bpi or 1600 bpi PE at 240 kB/s
 5016 GDR c.1973; 296 mm reel; 1.524 m/s; 200 or 800 bpi NRZI at 48 kB/s
 5017 USSR, GDR; magnetic tape store for 1022 & 1033; 296 mm reel; 75 ips; 8 & 800 bpi NRZI up to 64 kB/s
 5017.01 USSR c.1972
 5017.2 GDR c.1972; magnetic tape store; 200 or 800 bpi; 64 kB/s
 5017.3 Magnetic tape store for 1060; 200 or 800 bpi; 75 ips tape speed; NRZI
 5019 Poland c.1971; magnetic tape storage for 1030 & 1050; 296 mm reel; 120 ips; 200 or 800 bpi NRZI up to 96 kB/s
 5021 USSR, GDR; 200 or 800 bpi NRZI
 5022 CSSR c.1972; 75 ips (120 ips & 160 ips also reported); 800 bpi NRZI at 64 kB/s or 1600 bpi PE at 128 kB/s
 5025 USSR; 75 ips; 800 bpi NRZI or 1600 bpi PE; 50 MB capacity; 64 or 126 kB/s xfer rate
 5025.03 USSR c.1981; 800 or 1600 b/mm; up to 126 kB/s
 5026 Bulgaria c.1983; 40/150 MBytes; 75 ips; 63-FM/246-PSK b/mm; 126/712 kB/s
 5027 Bulgaria c.1983; 40/150 MBytes; 120 ips; 1600 bpi FM/6250 bpi GCR; 189/738 kB/s
 5028 Bulgaria c.1983; 40/150 MBytes; 200 ips; 63-FM/246-PSK b/mm; 315/1230 kB/s

MAGNETIC DRUMS: 503X-504X

5033 USSR; 6 MB; 20 ms average access time; 42 b/mm; 1500 rpm; 1250 kB/s xfer rate; 450 mm drum diameter; 800 info tracks
 5034 Poland; 2 MB; 20 ms average access time; 100 kB/s xfer rate
 5035 GDR, Poland; 2 MB; 20 ms avg access time; 800 bpi; 1500 rpm; 100 kB/s xfer rate; 320 mm drum diameter

MAGNETIC RIGID-DISK DRIVES: 505X-506X

5050 USSR; 7.25 MB; 6 disks/pack; 10 operating surfaces; 29-44 b/mm; 90 ms avg access time; 156 kB/s xfer rate; 2400 rpm; (200 + 3) tracks/surface
 5051 USSR; 100 MB nonremovable disk packs; 36 disks; 64 working surfaces; 250 ms avg access time; 384 tracks/surface; 83.25 kB/s xfer rate
 5052 USSR, Bulgaria; 7.25 MB; 6 disks/pack; 45 b/mm; 156 kB/s xfer rate; 2400 rpm; 95 ms avg access time; similar to 5050
 5053 Bulgaria; 7.25 MB; 6 disks/pack; 44 b/mm; 2500 rpm; IBM-1311 or -2311
 5055 GDR; similar to 5050
 5056 USSR; 7.25 MB; 6 disks/pack; 2400 rpm; 75 ms avg access time; similar to 5050

ES LISTING

5058 CSSR; changeable disk drive for 1010; similar to 5050; 90 ms avg access time
 5060 Hungary; 800 KB; 40 b/mm; 3600 rpm; 150 kB/s xfer rate; similar to 5050; used in 2010 processor of 1010 computer
 5061 Bulgaria; 29 MB; 11 disks/pack; 50 ms access time; 312 kB/s xfer rate; IBM-2314 compatible
 5063 317 MB disk drive
 5065 635 MB disk drive
 5066 USSR; 100 MB; 159 b/mm; 806 kB/s xfer rate; 3600 rpm; uses 5266 disk pack; 55 ms avg access time
 5067 Bulgaria c.1979; 200 MB; 5267 disk pack; 159 b/mm; 3600 rpm; 55 ms avg access time; 806 kB/s xfer rate
 5067.2 Bulgaria c.1978; 806 kB/s xfer rate; 159 b/mm; dual 100 MB drives; IBM-3330 compatible
 5067.4 Bulgaria; dual (?) 200 MB drives; IBM-3330-11 compatible
 5069 24 or 48 MB; "irremovable ... cassette disk;" 2 disks/pack; 2400 rpm; 12.5 ms avg access time; 1250-2500 kb/s xfer rate

OTHER MAGNETIC DEVICES: 507X-509X

5071 Magnetic card storage device; 125 Mb capacity; 2 KB/magnetic card; 800 bpi; 52 kB/s read-write speed; 5 us avg access time
 5074 Bulgaria; 3.2 Mb floppy; 3200 bpi; 1.89 trks/mm; 360 rpm; 280 kb/s
 5074.01 Existence known; no technical information
 5075 Bulgaria, CSSR; two 5074 floppies w/ctrlr; 250 kb/s xfer rate; produced at the Aritma plant in Prague
 5080 USSR; 200 MB rigid disk drive; 806 kB/s xfer rate; 30 ms avg access time
 5088 Bulgaria; 109.4 KB floppy disk; 125 kB/s xfer rate; 35 tracks; 300 rpm
 5094 Hungary; cassette tape unit; 200 kB/s xfer rate

MAGNETIC DISK PACKS: 52XX

5261 Bulgaria; 29 MB; 11 disks/pack; 90 b/mm; (200 + 3) trks/surface; IBM-2314, -2314A, & -2319 compatible
 5266.1 Bulgaria; 100 MB; 10 disks/pack; 159 b/mm; 192 tpi; IBM-3330
 5267 Bulgaria; 200 MB; 10 disks/pack; 159 b/mm; 370 tpi; IBM-3330-II
 5269 Bulgaria; 3.1 MB; single disk; 44 b/mm; 203 trks/surface; compatible with CDC-9427
 5269A Bulgaria; 1.22 or 2.45 MB; single disk; 44 or 88 b/mm; IBM-5444
 5274 Bulgaria; 8" floppy w/1.9, 2.1, 2.3, 4.5, 7.8, 9.0, or 9.6 MB
 5274.E3 Bulgaria; 5.25" floppy; soft, 10 hard, or 16 hard sectors

MAGNETIC TAPE CONTROLLERS: 550X-552X

(Actual transfer rate is a function of the tape drive, the controller, and the tape recording density.)

5503 USSR, CSSR; ctls 8 or 16 5002, -03, & -04 magnetic tape drives; 64-315 kB/s xfer rate
 5511 USSR; ctls eight NML-67, 5010, or 5012 tape drives; 64 kB/s xfer rate
 5512 Bulgaria; ctls eight 5012, -12.3, & -17 (possible) tape drives; 64 or 96 kB/s xfer rate; 200 or 800 bpi
 5514 USSR; ctls eight 5014 tape drives; 126 kB/s xfer rate
 5515 CSSR; ctls up to eight 5022 or -29 tape drives; 128 kB/s xfer rate
 5516 USSR; ctls eight 5016, -17, or -21 drives; 96 kB/s xfer rate
 5517 USSR; ctls up to eight 5010, -12.1, -17, -17.2, -19, -22, & -29 tape drives; 64, 96, or 128 kB/s xfer rate
 5519 Ctrlr for 5019 tape drive; 96 kB/s xfer rate

ES LISTING

5521 GDR; ctls eight 5016 tape drives; 64 kB/s xfer rate
 5525 USSR; ctls eight 5012, -17, -19, or -25 tape drives; 64, 126, 189 kB/s
 5525.03 Listed for ES-1036
 5525.05 Bulgaria
 5527 Bulgaria c.1983; ctls 5026/26/27; compatible to IBM-3803-2/3420-4, & Memorex 3222/26/28

MAGNETIC DRUM CONTROLLERS: 553X

5533 USSR; ctls eight 5033 drums; max xfer rate 1250 kB/s

MAGNETIC DISK CONTROLLERS: 555X-556X

5551 USSR; ctls eight 5050, 5051, 5052, or 5056 disk drives; 156 kB/s xfer rate
 5551-M USSR; disk storage controller
 5552 Bulgaria; ctls eight 5051, -52, -53, -56, or -58 drives; 156 kB/s NRZI
 5555 GDR; similar to 5552 but consumes more power
 5558 CSSR; ctls up to eight 5052 or 5058 units; 156 kB/s xfer rate
 5561 Bulgaria; ctls eight interchangeable disk drives; 312.5 kB/s xfer rate
 5563 Controller for 5063
 5565f Controller for 5065
 5566 USSR; ctls eight 5066 disk drives; 806 kB/s xfer rate
 5567 Bulgaria; ctls up to 32 spindles thru four 5667 ctl units; referred to as a ctl "module" vice the 5567 ctl "device"; 806 kB/s
 5568 USSR; ctls eight 5061 disk drives; 312.5 kB/s xfer rate
 5569 Ctls four 5069 cassette disks; 1500 kB/s xfer rate

MISCELLANEOUS: 56XX

5612 Bulgaria; magnetic tape drive similar to 5012.3 w/1600 bpi PE at 189 kB/s xfer rate; NRZI; uses 5525.3 ctlr
 5667 Bulgaria; ctls up to eight spindles from 5067 series disk drives

NONMAGNETIC INPUT DEVICES: 6XXX

(Some 61XX designators are not in sequence.)

CARD READERS: 601X and 611X

6012 USSR; mechanical feed up to 500 cards/minute in start/stop mode; photoelectric reader; Ryad-1
 6013 USSR; vacuum feed up to 1,200 cards/minute in a start/stop mode; photoelectric reader
 6014 I/O device
 6015 USSR; two frictional feeds for up to 2 x 600 cards/min; photoelectric reader
 6016 CSSR; mechanical feed up to 1,000 cards/minute; photoelectric reader; Ryad-1
 6019M USSR; vacuum feed up to 1,200 cards/minute; photoelectric reader
 6111 USSR; punch card reader; 50 cols/second; photoelectric reader
 6112 CSSR?; table card reader; 300 cards/min

PAPER TAPE READERS: 602X and 612X

6022 USSR, CSSR, Hungary; 1500 lpm; photoelectric reader; 5, 6, 7, or 8 trk paper tape; Ryad-1
 6025 I/O device
 6121 Hungary, Poland; used with the 1010; 300 char/s; photoelectric reader

ES LISTING

6122 Poland; 1000 char/s; photoelectric reader; 5, 6, 7, or 8 trk paper tape
 6191 CSSR, Hungary; paper tape I/O device; 40 char/s; 5 or 8 trk tape

OPTICAL CHARACTER READERS: 603X-604X

6031 Up to "400 documents per minute"
 6032 Existence known; no technical information
 6035 Existence known; no technical information
 6041 Existence known; no technical information

MICROFICHE INPUT UNITS: 660X

6602 1,000 char/s; 96 char set

NONMAGNETIC OUTPUT & I/O DEVICES: 7XXX

CARD PUNCHES: 701X

7010 USSR; mechanical feed up to 100 cards/min; 256 byte buffer storage; sequential column punch
 7012 USSR; mechanical feed up to 250 cards/min; parallel line punch; 256-byte buffer storage
 7013 CSSR; buffer memory
 7014 CSSR; mechanical feed up to 160 cards/min; sequential column punch
 7018 USSR; punches up to 100 cards per minute

PAPER TAPE PUNCHES: 702X

7022 USSR; 150 char/s; 5 & 8 track paper tape
 7024 100 lines/sec; 5 or 8 track paper tape

LINE PRINTERS: 703X-704X

7030 USSR; "barrel" (drum); 650-900 lpm; 128 char/line; 96 char set
 7031 GDR; drum; 900-1200 lpm; 120 char/line; 63 char set
 7032 USSR; drum; 900 lpm; 128 char/line; 84 or 96 char set
 7033 Poland; drum; 600-1100 lpm; 120, 126, 128 or 160 char/line; 83+1 char set
 7033M Poland; parallel printer
 7034 CSSR; printer used at least with the 1010 & the 1025; 900 lpm; 132 char/line; 64 char set
 7035 GDR; 600-1100 lpm; 120 char/line; 64 char set
 7036 USSR; 800 lpm; 132 char/line; paper is 80 x 420 mm
 7037 USSR; chain; 1200 lpm; 132 char/line; 48, 64, 96, 128, & 192 char set
 7038 CSSR; 750-1000 lpm; 132 or 160 char/line; 35, 64, or 96 char set
 7039 GDR; chain; 900-1500 lpm; 132 or 160 char/line; 48 or 96 char set
 Hungary c.1979; 64/96 char set for 80/132 char/line; 245-1100 lpm
 7040 400 lpm; 132 char/line; 84 char set; paper is 80 x 420 mm
 7045 150 dots/s
 7049 Hungary; drum; 750 or 1200 lpm; 132 char/line; 64 or 96 char set; contains buffer storage

PLOTING EQUIPMENT: 705X

7050 USSR; 8 b/mm; magnetic tape recorder for use with 7051, -52, & -53 plotters
 7051 USSR; flatbed plotter; 1 square meter area; 255 symbols; 0.025 or 0.05 mm writing element spacing; speed up to 50 mm/s; 3 colors avail
 7052 USSR; drum plotter; plot speed 200 mm/s; 380 x 600 mm working area;

ES LISTING

- 64 symbols; 0.1-0.05 mm writing element spacing; 3 colors avail
 7053 USSR; drum plotter; auto 3-color "capability;" plot speed 150 mm/s;
 841 x 1600 mm (or 730 x 1600 mm) working field; 253 symbols; 0.1 mm
 writing element spacing
 7054 CSSR; "plane surface plotter;" 1600 x 1200 mm working field; max
 driving speed 100 mm/s; 96 symbols; 4 colors available

VIDEO DISPLAYS: 706X

- 7061 Hungary; 16 (64) or 12 (80) lines on screen (char per line); 64 char
 set; 1024-byte buffer
 7063 Hungary, CSSR; 16 (64) or 12 (80) lines on screen (char/line); 96 char
 set; 1024-byte buffer; produces printed copies; CSSR model also has
 15 (64) screen display
 7064 USSR; raster (1024 x 1024 dots) & vector (5-7 mm/us) scan; 49 or 74
 char/line; 430 mm (diagonal) screen
 7065 Hungary c.1979; AN/graphic display
 7066 USSR; vector scan; 6 or 12 lines; 128 char set; 40 or 80 char/line
 7067 Graphic display
 7068 Hungary c.1979; 16 lines; 80 char/line
 7069 GDR; "control unit;" 92 char set
 7069M GDR; operator & service console for 1055 processor

SERIAL PRINTERS: 707X

- 7070 USSR; letter arm; 10 char/s; 92 char set ; 106 char/line; mechanical
 keyboard
 7071 CSSR; typewriter used at least with the 1010; 10 char/s
 7072 117 char/line; 10 char/s printing speed
 7073 GDR; letter arm; 9.5 char/s; 92 char set; mechanical keyboard
 7074.1 Bulgaria; letter arm; 10 char/s; 92 char set; mechanical keyboard
 7074.2 Bulgaria; turning disc (daisy wheel?); 30 char/s; 92 char set; reed
 relay keyboard
 7076 Poland; matrix printer; 180 char/s; 92 char set; reed relay keyboard
 7077 USSR; letter arm; 10 char/s; 92 char set; 106 char/line; mechanical
 keyboard

TERMINALS: 71XX

- 7111 I/O device
 7112 I/O device
 7122 Poland; paper tape I/O device; 100 char/s; 5 or 8 track tape
 7168 Hungary; same as VT-340 & SM-7206; intelligent video terminal
 7172 CSSR; "Consul" 260.1 typewriter
 7173 GDR; unit for direct comms of operator with computer
 7174 Bulgaria, Poland?; unit for direct comms of operator with computer
 7181 CSSR; mosaic printer; 80 char/s in start/stop mode; 160 char/s in
 continuous mode; 132 char/line; 96 char set; Consul-2111
 7183 GDR; A/N printer
 7184 Hungary; printer; 80 char/line; 253-283 lpm; 205 mm print field width
 7186 Poland, Hungary; mosaic printer; 180 char/s; 132 char/line
 7187 Bulgaria; ISOT-132D; printer; uses floppy disk
 7191 CSSR, Hungary; paper tape & punch card I/O device; 33 char/s; 5 & 8
 track tape
 7192 CSSR; paper tape I/O device

SPECIAL PRINTERS (?): 72XX

ES LISTING

7230 Laser; 6,000 lines/min
 7231 Laser; 6,000 lines/min
 7240 Electrostatic; 1,000 lines/min

CONTROL UNITS: 75XX

7565 Ctls up to four 7065 video display units
 7566 Ctls up to sixteen 7066 display screens or 7174 typewriters; two buffer memories; 9-bit wordlength

MICROFICHE OUTPUT UNITS: 76XX

7602 GDR; microfilm output unit; 5 microfiches/min
 7612 Microfiche storage & access unit; 10k to 100k microfiche capacity; 10-second retrieval time

INPUT/OUTPUT SYSTEMS: 79XX

7901 Graphic display
 7902 GDR; consists of 6122 paper tape reader & 7024 paper tape punch
 7902M GDR; model-1 uses paper tape & magnetic tape; model-2 uses paper tape only
 7903 USSR; paper tape I/O: 1500 char/s input, photoelectric reader; 150 char/s output; 5 or 8 track paper tape
 7903.M USSR; new ICs and improved power supply
 7904 Punched card I/O; 1,500 to 2,000 char/s input; photoelectric reader; 150 to 200 char/s output
 7905 USSR; I/O of alphanumeric & graphic data; uses four 7065 CRTs & 7565 ctls; 96 char set; 49 or 74 char/line
 7906 USSR; display group control; 7172 printer, up to 16 7066s + 7566 ctrl; 40 or 80 char/line; 6 or 12 lines/s; 96 symbols; 4096-Byte buffer
 7907 CSSR; Digigraf 1208/1712 plotter
 7908 USSR; I/O of alphanumeric & graphic data
 7910 USSR, Poland; A/N display
 7920 USSR, GDR; alphanumeric display system: 7922 ctrl; up to 7927s & 7934s; 600, 1200, 2400, & 4800 b/s
 7920M GDR; display system
 7920.01 c.1984; 1.9 kB buffer memory
 7920.11 A/N display complex; 7921 + 7927 + 7934
 7920.21 A/N display complex; 7925 + 7934
 7921 Group control unit; 600, 1200, 2400, & 4800 b/s data trans rate via telephone lines; controls up to 32 units; part of 7920 complex of alphanumeric display stations; 480-Byte buffer memory
 7921.01 c.1984; 1.9 kB buffer memory; may interface with 7927, 7927.01, or 7034.01
 7921.02 c.1984; 1.9 kB buffer memory; may interface with 7927, 7927.01, or 7934.01
 7922 Group ctrl unit for 7920; I/O interface between computer & 7927 & 7934 units; 200 kB/s
 7922.01 c.1984; control unit; 1.9 kB buffer memory; may interface with 7927, 7927.01, 7934, or 7934.01
 7925 CSSR; video terminal
 7925M Programmable display user station
 7927 Dot matrix I/O display station; screen capacity 480 or 1,920 char; 96 char set; 20 char/s
 7929.01 USSR; display
 7934 CSSR; matrix printer; 96 char set; 132 char/line; 40 char/s

ES LISTING

25X1

7934.01 CSSR? c.1984
 7934.02 CSSR; dot matrix printer
 7941 CSSR; graphics complex
 7942 CSSR; graphics complex
 7943 CSSR; graphics complex
 7971 USSR; display
 7980 Graphics display

DATA COMMUNICATION EQUIPMENT: 8XXX

MODEMS: 800X-801X

8001 USSR, Bulgaria, Hungary, CSSR, Romania; FM; 200 b/s; full duplex; sync or async
 8002 GDR, CSSR, Hungary, Poland; FM; 200 b/s; half or full duplex; async
 8004 Hungary; 200 baud
 8005 USSR, Bulgaria, Romania; FM; 600 or 1200 b/s; half or full duplex; sync or async
 8006 CSSR, Hungary, Poland; 5 models, some with automatic call device; 600 or 1200 b/s; half duplex
 8007 Hungary c.1980; 4 phase; 600 or 1200 b/s; full duplex; sync or async
 8009 Bulgaria; 600 and 1200 baud
 8010 USSR; PM; 600, 1200, or 2400 b/s; full duplex; sync
 8011 Hungary; PM; 1200 or 2400 b/s; half or full duplex; sync
 8013 Hungary, Poland c.1981; microP based; 8 phase; half or full duplex
 8015 USSR; PM; 2400 & 4800 b/s; full duplex; sync
 8017 Romania; 4800 baud
 8018 Hungary c.1981; microP based; 8 phase; 2400 to 4800 b/s; half & full duplex
 8019 USSR; bipolar amplitude modulation; 24,000 & 48,000 b/s; full duplex; sync

SIGNAL CONVERTERS: 802X-803X

8025 Unit of remote data processing
 8027 Bulgaria; half or full duplex; sync: 600, 1200, 2400, & 4800 b/s; async: to 4800 b/s
 8028 Hungary; unit of remote data processing
 8029 Poland, USSR; bipolar amplitude modulation; 9600 b/s; half or full duplex; sync or async
 8030 USSR, Bulgaria; half or full duplex; sync: 20, 50, & 100 b/s; async: up to 200 b/s
 8032 CSSR, Hungary; half or full duplex; sync or async; 50, 100, & 200 b/s
 8033 Bulgaria; 50, 75, & 100 b/s; also model with automatic call device; half duplex; async
 8036 Hungary; 300, 1200, & 4800 baud
 8040 Unit for remote data processing

AUTOMATIC TELEPHONE CALLERS: 806X

8060 Unit for remote data processing
 8061 USSR, Hungary; auto connection over switched voice-grade lines; 50 b/s
 8062 Poland; telephone caller
 8063 USSR; auto connection over switched 4-wire telegraph links; 50 b/s
 8070 Hungary
 8080 Unit for remote data processing

25X1

ES LISTING

ERROR PROTECTION DEVICES: 81XX

8121 USSR; 600 & 1200 b/s; half duplex
8122 Hungary, Bulgaria; 200, 600, 1200, 2400, & 4800 b/s; full duplex
8131 Unit for remote data processing
8135 USSR; 50, 100, 200, 2400, & 4800 b/s; full duplex
8136 Unit for remote data processing
8140 USSR; 24,000 or 48,000 b/s; full duplex

DATA COMMUNICATION PROCESSORS: 83XX

8371 Bulgaria, Poland?; ctls host-terminal comms; 32-512 KB memory; 56 kB/s max xfer rate; top of four models can support up to 352 comms lines
8371.01 Poland? c.1984; telecommunication processor

DATA TRANSMISSION MULTIPLEXERS: 840X-844X

8400 CSSR; max 16 lines; up to 100 b/s over telegraph; up to 4800 b/s over telephone lines; MPD-1A
8401 Bulgaria; up to 31 2-wire telephone lines at 50, 100, 200, 600, 1200, & 2400 b/s; 50, 100, & 200 b/s over telegraph lines; MPD-1
8402 USSR; 8 to 176 half duplex or up to 88 full duplex lines; up to 4800 b/s; MPD-2
8403 USSR; computer-computer comms over four half duplex or two full duplex lines; 50, 100, 600, 1200, 2400, & 4800 b/s; MPD-3
8404 GDR; ctlr; max 12 lines; sync or async; half duplex; up to 9600 b/s; MPD-4
8410 Hungary, Bulgaria; data transmission mux; MPD-10
8421 Hungary c. 1976; 600 & 1200 b/s; half or full duplex; sync or async

USER CONSOLES: 85XX

8501 Bulgaria; AP-1; 50, 100, 200, 300, 600, & 1200 b/s; async; half duplex; typewriter & paper tape I/O
8502 USSR; AP-2; 200 b/s over telephone lines; 50, 100, & 200 b/s over telegraph lines; sync; half or full duplex; typewriter I/O; uses 6191, 7191, & 7172
8503 USSR, Hungary, Bulgaria; AP-3; unit for remote data processing
8504 USSR; AP-4; 1200 or 2400 b/s; sync; half duplex; card, paper tape, mag tape & CRT I/O
8505 GDR; AP-5; 200, 600, & 1200 b/s over telegraph lines
8506 GDR; AP-6; 600 & 1200 b/s over telegraph lines
8511 USSR; AP-11; half duplex; 600, 1200, & 2400 b/s; smart terminal
8514 Poland; AP-14; 600, 1200, & 2400 b/s; paper tape I/O; card input; mag tape storage; typewriter; CRT display; alphanumeric printer
8531 Bulgaria; AP-31; punched card & paper tape I/O; mag tape storage; 200, 600, & 1200 b/s; smart terminal
8532 GDR; AP-32; punched card & paper tape I/O; 200, 600, & 1200 b/s; smart terminal
8534 Hungary; AP-34; programmable user station (smart terminal); TAP-34; 2400 bauds
8540 CSSR; data acquisition station
8542 Terminal
8550 Hungary; AP-50; 600, 1200, 2400, 4800, & 9600 b/s
8551 Universal programmable user station
8556 Programmable display user station

ES LISTING

8561 USSR; AP-61; 200, 1200, & 2400 b/s; half duplex; sync or async; CRT & typewriter I/O
 8562 Hungary; AP-62; 200, 600, 1200, & 2400 b/s; half duplex; CRT I/O
 8563 USSR; AP-63; 1200 or 2400 b/s; sync or async; half duplex; CRT I/O
 8564 Hungary; AP-64 user station; 600, 1200, 2400, & 4800 b/s
 8570 USSR, Hungary; AP-70; 100 b/s; async; half duplex; mechanical typewriter I/O
 8571 Bulgaria; AP-71
 8574 Hungary; AP-74
 8575 Poland; AP-75
 8575M Poland c.1984; terminal with floppy disk
 8576 Terminal
 8577 GDR; programmable multifunctional user station
 8579 Terminal
 8591 CSSR; 50, 75, & 100 b/s
 8592 GDR; terminal
 8593 CSSR; 100 & 200 b/s

DATA PREPARATION STATIONS: 9XXX

MAGNETIC TAPE PREPARATION STATIONS: 900X

9001 USSR; for ES and Minsk-32 computer input; 96 char set; 8 b/mm; 15 char/s from keyboard
 9002 Bulgaria; 39.6 cm/s; 800 bpi NRZI; 80 or 160 char/blk; direct recording from keyboard; 220 volt power supply
 9002.1 Bulgaria; 110-volt version of 9002
 9002.2 Bulgaria; compatible with ISOT 230 printer
 9003 Bulgaria; 9 tracks; 800 bpi NRZI; processes & pools inputs from up to 16 keystations
 9004 Bulgaria, USSR?; 39.6 cm/s; 800 bpi NRZI; 80 or 160 char/blk consists of mag tape, monitor, and keyboard
 9004.01 Can use two of these units to do a direct tape-to-tape data transfer without the use of a computer
 9004.02 Allows recorded data to be printed on ISOT-0230 printer without the use of a computer
 9004.03 Provides means for direct data entry and recording of information from ISOT-6001 punched-card reading unit
 9004.04 Uses input via ES-9114 floppy and output to mag tape
 9005 Bulgaria c.1982; mag tape data preparation station with up to 32 work stations
 9006 Hungary; uses 5094; 2 x 80 KB storage capacity; 140 Bytes/s; for searching & updating data
 9009 USSR; uses two 5091 drives

PUNCHED-CARD PREPARATION STATIONS: 901X

9010 Ryad-1 equipment
 9011 USSR; card reader-punch; 15 cols/s manual input; 25 cols/s duplicating speed; 100 cols/s without punching
 9011.1 USSR; modification of 9011; same basic parameters; integrated circuit electronics now standard feature
 9012 USSR; card punch; 15 cols/s manual; 25 cols/s duplicating; 100 cols/s without punching
 9013 USSR; card punch check unit; 15 cols/s manual check; 25 cols/s

ES LISTING

automatic check; 100 cols/s output speed without punching
9013.1 USSR; modification of 9013; same basic parameters
9014 CSSR; punch card column decoder & labeler; 60 cols/s; 80 cols/card
9015 CSSR; card punch & labeler; 60 cols/s without punching; 80 cols/card
9017 USSR; punch card decoder; 25 cols/s normal; 100 cols/s without punching
9018 CSSR; punched card verifier; 290 cols/s reading speed

PAPER TAPE PREPARATION STATIONS: 902X

9020 USSR; 8 track paper tape; 10 or 50 char/s; typewriter input; photoelectric reader
9021 CSSR, Hungary; 10 or 50 char/s; typewriter input; photoelectric reader
9022 CSSR, Hungary; 10 or 50 char/s; electronic keyboard; photoelectric reader
9024 USSR; 5 or 8 track paper tape; 10 or 50 char/s; typewriter; photoelectric reader

MISCELLANEOUS DATA PREPARATION STATIONS: 904X-91XX

9041 CSSR; punched card sorter; 80 cols/card
9050 Existence known; no technical information
9053 CSSR; Consul 9114
9070 Bulgaria c.1984; mag tape data preparation; 800 bpi; 25 ips
9080 CSSR; punched-card verifier; 60 cols/s
9110 CSSR; Consul 271
9111 CSSR; Consul 2711; data recorder on floppy disk
9112 Bulgaria; floppy disk unit; CRT, keyboard, & typewriter; microP-based; 2 disk memory units
9112S Hungary; floppy disk; 20,000 char/s; 243 KB disk pack capacity; 74 trks
9113 Bulgaria c.1981; mag tape & floppy disk unit
9114 Bulgaria; floppy disk; succeeds 9002 & 9004
9150 Poland; mag tape system contains: processor, 5001 mag tape storage, two disk storage units, alphanumeric printer, up to 32 operators' consoles, & CRT

SM LISTING

25X1

COMPONENT LISTING FOR SM SMALL-COMPUTERS

(All equipment designators preceded by SM unless otherwise specified.)

In those cases where we obtained conflicting data on the operational parameters of indigenous Soviet computer systems, we used our best engineering judgment to select the most likely operational values.

SM-II COMPUTER SYSTEMS

25X1

SM LIST

50/20 CSSR c.1984; sequential controller
 50/40-1 USSR, CSSR; 8-bit microC based on K580 (= Intel-8080A) microP
 50/40-3 MicroC based on 8-bit uP; 1 MHz clk; RAM: 4KB static & 8 KB dynamic; 16 KB ROM
 50/50 CSSR c.1985; 16-bit microC based on Sov. K1804 microP (= US AMD-2901)
 50/50.M1 CSSR c.1986; 16-bit miniC 4K upgm ctl; optional floating-point processor; up to 2 MB main memory
 50/50 PLUS CSSR c.1984; same as 50/50.M1
 50/60 USSR c.1984; software compat w/SM-2M; 16KW upgm storage
 51/10 Hungary; same as ES-1011 or R-11
 51/13 CSSR c.1984; "emulative" computer
 52/10-1 Hungary; see 1502
 52/11 CSSR c.1983; miniC; copy of PDP-11/60;
 52/11.M1 CSSR c.1984; 16-bit miniC; up to 1.25 MB main memory (used Czech 16-Kbit DRAMs); has CIS (commercial instruction set)
 52/11 PLUS CSSR c.1984; same as 52/11.M1
 52/12 CSSR c.198?; 32-bit supermini; 16 address and general-purpose registers; 8 Kb cache memory; 32-bit virtual address space; eventually up to 32 MB main memory
 53/10 CSSR c.1984; multicomputer system based on 50/50 or 50/40
 54/30 CSSR c.1984; "video graphic" computer

SYSTEM INTERFACES: 010X

0101 CSSR; system interface unit for SM-3 & SM-4; consists of 2001 & 3501 SM units
 0102 CSSR; interface boards for SM-3 & SM-4; async
 0203C "Input module" for SM-52/11
 0205 A "simple" timer used on SM-52/11
 0211.2 Diagnostic control memory on Czech SM-52/11

SPECIAL-PURPOSE DEVICES: 05XX

0502 Cuba; SM 54/10-4; special-purpose decimal processor for use with SM-3 & SM-4; upgm ctl; 16 bits/word

COMPUTER SYSTEMS: 1XXX

SM-1 USSR; 133 kOPS; 8-64 KB; modeled after Hewlett-Packard 2100 series
 SM-2 USSR; 154 kOPS; 64 - 256 KB; modeled after Hewlett-Packard 2100 series
 SM-3 USSR, CSSR, Poland, Cuba?; 135 kOPS; 56 KB; modeled after PDP-11/05; also referred to as SM-1301

SM LISTING

3/20 CSSR SM-3
 SM-4 USSR, CSSR, Romania (Independent I-100); 213 kOPS; 248 KB max; modeled after PDP-11/40; also referred to as SM-1401
 SM-4 Bulgaria; ISOT-1016S
 SM-4A Poland; 128 KB; compat w/DEC PDP-11/40; Warsaw Era prod 98 units in 1983
 4-20 CSSR SM-4; copy of PDP-11/34A; 256 KB DEDSEC memory; floating-point board
 SM-5 USSR; 1,000 kOPS; 32 to 512 KB
 1210 USSR c.1982; up replacement for M-6000, M-7000, SM-1, & SM-2
 1300 USSR; 64 KB memory; 500 kOPS; microP-based SM-3
 1301 USSR; same as SM-3
 1403 USSR; may use Italian peripherals
 1407 USSR; variation of SM-4
 1410 USSR c.1981; a two-processor complex consisting of 2104 and 2410; system can work with SM-4 or MIR computer equipment
 1420 USSR; first mentioned c.1982; follow-on to SM-4; up to 1920 KW memory; similar to SM-5
 1502 Hungary SM-52/10-1; State tests Nov 1983; compatible w/ SM-4 or ES-1011; uses ECL microP
 1600 USSR c.1983; two-processor 16-bit miniC; single-bus interface; compatible w/ SM-3/SM-4 software; SM-1420 & M5100
 1601 64x16 or 40x12 char/lines dumb display
 1604 Bulgaria; video terminal used w/ SM-3 & -4 and w/ Estel 4.1 comms on ES
 1605 "Miniterminal"
 1613 Existence known; no technical information
 1617 GDR; office processor; designed chiefly for bookkeeping
 1621 MicroP-based workstation
 1624 GDR; SM 50/10-1; 8-bit microC; 6 general-purpose registers; 16 KB memory using 4 Kb chips; 50 to 9600 b/s async comms xfer rate
 1626 GDR; SM 50/40-2; 8-bit microC; 128 KB memory
 1627 Bulgaria; microcomputer
 1630 GDR c.1983; same as Robotron K-1630 ?
 1633 Poland; part of MERA-60 (Elektronika-60 in USSR) family; 16-bit microC; inst set similar to SM-3; 8 KB memory
 1634 USSR; based on 16-bit SM-50/60 microC; 256 KB main memory
 1800 USSR c.1982; microC based on K580 microP; 32-64 KB memory; 200 watts; 500 kOPS; 2 to 8.5 us/inst
 1803.05 MicroC; 64 KB main memory

TIMERS: 20XX

2001 Programmable timer for SM-3, SM-4, & SM-52/11; common bus; 100 kHz, 10 kHz, or 50 Hz; time interval precision $\pm .01\%$

CENTRAL PROCESSING UNITS: 21XX-24XX

2101 USSR; central processor for SM-1; up to 270k words/s xfer rate; 16 data bits/word; 5 general-purpose registers
 2102 USSR; central processor for SM-2; upgm ctl; 16 data bits/word; 2.2 us/fixed point add
 2103 USSR; central processor for SM-3; upgm ctl; up to 1,300k words/s xfer rate; 16 data bits/word; 8 general-purpose registers
 2104 USSR; central processor for SM-4; upgm ctl; 16 data bits/word; 8 general-purpose registers; handles SM-4 operating system
 2301 CSSR; central processor for SM-3 model 20; similar to 2103
 2302 Poland; central processor for SM-3; similar to 2103

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2303 Cuba; central processor for SID-300; similar to 2103
 2401 CSSR; central processor for SM-4 model 20; similar to 2104
 2402 Romania; central processor possibly for Independent-100; similar to 2104
 2410 USSR; second processor on the 1410 two-processor complex; serves as an ANALITIK language interpreter
 2420 USSR; CPU for 1420 computer; uses K1804 microP and K565RU3 16Kbit DRAMs

INTERNAL MEMORY UNITS: 3XXX

3100 USSR; ferrite main memory; 32K word capacity; 1.2 us cycle time; (16 data + 2 parity bits)/word
 3101 Poland; ferrite main memory; 32K word capacity; 1.2 us cycle time; (16 data + 2 parity bits)/word
 3102 Ferrite main memory; 16K word capacity; (16 data + 2 parity bits)/word; 1.2 us cycle time; with SM-3
 3103 CSSR; ferrite main memory for SM-3 & SM-4; 8K to 32K words/module in 8K increments; (16 data + 2 parity bits)/word; 1 us cycle time
 3105 USSR; ferrite main memory for SM-2; 32K word capacity; 18 bits/word (probably contains 2 parity bits); 1.0 us access time
 3501 Bulgaria; ISOT-3501C; semiconductor memory for SM-3 & SM-4 8, 16, 24, 28, or 32K words storage modules; 400 ns access time; 16 bits/word for SM-3; (16 data + 2 parity bits)/word for SM-4; common bus interface
 3509 Semiconductor memory
 3510 Semiconductor memory module for SM-3 & SM-4; (16 data + 2 parity bits) per word; 16K word capacity per module; 0.7 us cycle time
 3511 CSSR; semiconductor memory module for SM-4 model; up to 128K words/module; (16 data + 6 parity bits)/word; 0.6 us access time; 0.8 us cycle time

INTERFACE EXPANDERS: 41XX

4101 For use in SM-3 & SM-4; 1,000 char/s xfer rate; 1,280 8-digit symbol buffer memory; expands I/O functions with a reduction in system speed
 4104 For use in SM-3 & SM-4; 1,000 char/s xfer rate; 1,280 8-digit symbol buffer capacity
 4501 USSR; common bus switch for SM-1300
 4503 USSR; establish comms channel between common-bus small computers

EXTERNAL MAGNETIC STORAGE: 5XXXMAGNETIC TAPE CONTROLLERS: 50XX

5001 Bulgaria; ISOT-5000C; transport controller for ISOT 5003, 5005, & 5006; 9 trk tape; 800 bpi; 32, 64, 96, 114, & 190 cm/s; NRZI
 5074.01 Dual floppy disks with capacity of 256 KB

MAGNETIC DISK CONTROLLERS: 51XX

5102 Poland; ctls up to four 5401 disk drives; 2500 kb/s xfer rate
 5105.1 USSR, Bulgaria; ctls up to four SM-5400, 5401, or 5403 disk drives; 11.1 us/word xfer speed; 1500 rpm
 5105.7 Disk controller

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MAGNETIC CASSETTE TAPE (3.81 mm) STORAGE: 52XX

5202 Poland; 5.76 MB capacity; 800 bpi; 0.5 kB/s xfer rate
 5203 CSSR; 3.2 MB capacity; 800 bpi; 0.125 kB/s xfer rate
 5204 450 KB capacity
 5205 Poland; 2 trk cassette tape storage unit; 5 Mb capacity; 800 bpi;
 5 ips tape speed; PE
 5208 Magnetic cassette tape unit for use with SM-3 & SM-4
 5211 Mag tape cassette unit; 2 cassette capacity (5204.01); 800 bpi;
 1.25 KB/s; common line interface
 5269.1 Bulgaria; removable disk cartridge; 3 MB

MAGNETIC TAPE (12.7 mm) STORAGE: 53XX

5300 Bulgaria; ISOT-5004E; mag tape unit; 10 kB/s xfer rate; 800 bpi; NRZI;
 9 trk tape; .3175 m/s; 100 MB capacity
 5300.01 Bulgaria; 800 bpi; NRZI; 12.5 ips; 10 kB/s
 5301 Magnetic tape unit for SM-3 & SM-4; 10 kB/s xfer rate; NRZI
 5301.10 Magnetic tape drive
 5302 Bulgaria; ISOT-5005; mini-mag tape unit; 800 bpi; NRZI; 12.5 ips tape
 speed; 20 kB/s xfer rate; 9 trks; 200 MB capacity
 5303 Bulgaria; ISOT-5006; 800 bpi; 36 kB/s xfer rate
 5304 Poland; 800 or 1600 bpi; 40 kB/s xfer rate
 5305 USSR; 800 or 1600 bpi; 75 ips; 64 or 126 kB/s xfer rate
 5306 Bulgaria; 1600 bpi (PE); 800 bpi (NRZI); 75 ips; 126 & 64 kB/s
 5308 c.1984; mag tape drive
 5309 Bulgaria; 1600 bpi (PE); 800 bpi (NRZI); 45 ips; 72 & 36 kB/s

REMOVABLE CASSETTE DISK STORAGE: 54XX

5400 Bulgaria; ISOT-1370; 5 MB (2.5 fixed + 2.5 removable);
 50 ms avg access time; 1500-2400 rpm; 180 & 312 kB/s xfer rate;
 uses ES-5269.1 disk pack
 5401 Poland; MERA-9425; cassette-type plug in disk storage; 50 Mb capacity;
 312 kB/s xfer rate; 2400 rpm; 40 ms avg access time
 5402 External memory system
 5402.09 Magnetic disk
 5403 CSSR; disk storage with removable disk; 50 Mb capacity; 2500 kb/s
 xfer rate; 30 ms avg access time
 5404 29 MB disk drive
 5405 Bulgaria; for SM-4 computers
 5407.09 Interchangeable magnetic disk
 5408 Cartridge disk system; 16 MB total; 38 ms access time; 4064 bpi
 5410 Bulgaria; 11.5 MB; 406 trks/surface; 79 b/mm; 200 tpi
 5412 Bulgaria c.1983; 80 MB; 806 KB/sec at 2400 rpm or 1209 KB/sec at 3600;
 45 msec avg access time

FIXED-HEAD DISK STORAGE: 55XX

5500 Hungary; fixed-head disk storage; 0.5 MB capacity; 1350 kb/s xfer rate;
 10 ms avg access time
 5501 USSR; fixed-head disk storage; 0.864 MB capacity; 670 kb/s xfer rate;
 10 ms avg access time

FLOPPY DISK STORAGE: 56XX

5601 Hungary; floppy disk storage unit; 3 Mb capacity; 250 kb/s xfer rate
 5602 Poland; floppy disk storage unit; 3.2 Mb/disk; 2 disks; 6.4 Mb total

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capacity of which 4.1 Mb is useable; 205 ms avg access time; 360 rpm; 250 kb/s xfer rate

5603 Floppy disk memory unit for SM-3 & SM-4; 0.5 MB capacity; 40 KB/s xfer rate; 300 ms avg access time; 128 b/mm

5604 CSSR; Consul 7112; 3.2 Mb capacity; 250 kb/s xfer rate

5605 CSSR, Hungary; 6.4 Mb capacity; 400 kb/s xfer rate; 500 ms avg access time; uses two 512 KB floppy disks

5606 Hungary; 6.4 Mb capacity; 250 kb/s xfer rate; 370 ms avg access time

5608 Poland; consists of one 5602 disk drive, ctrlr, & power supply; 4.1 Mb capacity; 205 us avg access time; 250 kb/s xfer rate

5612 Bulgaria; 32 or 1600 bpi; 96 or 189 kb/s

5615 Floppy disk storage for SM-3 & SM-4; 3.2 Mb capacity; 250 kb/s xfer rate

5616 Floppy disk storage for SM-3; 19 bytes/us xfer speed; 0.5 MB capacity; 508 ms avg access time; 128 b/mm

GENERAL-PURPOSE CONTROLLERS: 60XX

6001 P80-8 parallel adapter for SM-3 & SM-4; connects peripherals with 8-bit IRPR interface; 300 kb/s async

6002 Serial adapter for SM-3 & SM-4; 9.6 kb/s async; connects to IRPS or S2 interface

CARD READERS: 61XX

6101 Hungary; VT-42111; 80 cols/card; 600 cards/minute

6102 GDR; Daro-1220; 160 cards/minute

6103 Romania; 300, 400, 600, or 800 cards/minute; photoelectric reader

6105 Romania; RSD-9226; 300 to 800 cards/minute

PAPER TAPE INPUT, OUTPUT, & I/O DEVICES: 62XX

6200 Hungary; MPR-51/301; I/O unit; 50 or 500 lines/s; 5 or 8 trk tape

6201 I/O unit for use with SM-3 & SM-4

6202 I/O unit; 300 lines/s input; 50 lines/s output; photoelectric reader; 5 or 8 trk tape

6202.01 Existence known; no technical information

6203 Hungary; MR-301; input unit; 5 or 8 trks

6204 Poland; SPTP-3; I/O unit; 50 or 100 lines/s; 5 or 8 trks

6205 Poland; ST-2030; input unit; 300 lines/s; 5 or 8 trks

6206 GDR; Daro-1215; output unit; 50 lines/s; 5 or 8 trk tape

6208 CSSR; Consul 337.2; input unit; 100 rows/s in start/stop mode; 300 rows/s in continuous mode; 8 trk tape

6209 CSSR; FS-1503; input unit; 1,500 lines/s; 8 trk tape

6216 Poland; ST-2100/2200; input unit; 1,000/2,000 lines/s; 5 or 8 trks

6222 Poland; DT-105C; output unit; 50 lines/s; 5 or 8 trk paper

6227 Hungary; MP-51; output unit; 50 lines/s; 5 or 8 trk paper

ALPHANUMERIC PRINTERS: 63XX

6300 DZM-180 plus ctrlr; 180 char/s; 132 char/line; 256 symbol buffer memory

6300.01 Existence known; no technical information

6301 GDR; Daro 1156; sequential mosaic printer; 100 char/s; 132 char/line; 96 char set

6302 Poland; DZM-180; sequential mosaic printer; 180 char/s; 132 or 138 char/line; 128 char set

6303 CSSR; Consul 211.1; sequential dot matrix printer; 150 char/s; 132 char/line; 96 char set

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6304 GDR; Daro 1156; sequential mosaic printer; 100 char/s; 132 char/line
 6305 Used with SM-3 & SM-4; 132 char/line; four models: 96 char at 500 lines/s & 64 char at 700 lines/s; both come with or without a programmable carrier
 6306 Hungary; VT-25112; parallel printer; 900 lines/min; 96 char set; 132 char/line
 6307 GDR; dot-matrix printer; 45 char/s continuous mode; 25 char/s start/stop mode; 96 char set; 132 char/line
 6308 USSR; "graphic character synthesizing printer" using dot-matrix based mechanism; 100 char/s; 7x5 dots/char; 96 char set; 128 char/line
 6309 GDR; Robotron 1157; high-speed column mosaic printer; 132 or 210 char/line; 150 to 180 or 320 to 360 char/s; 96 to 192 char set; backward & forward printing
 6312 Bulgaria; ISOT-0232D; sequential printer with keyboard; 20 char/s; 132 char/line; 96 char set
 6312.1 Bulgaria; sequential printer with keyboard; 25 char/s; comms terminal; uses ES-7187 printer
 6312.2 Bulgaria; similar to 6312.1; uses SM EVM IRPS interface
 6313 GDR, Hungary; parallel printer; 660 lpm; 96 char set; 136 char/line; Videoton 270; Robotron 1152
 6315 USSR; 132 char/line; 25 char/s; uses ES-7187 printer; four models: 500 lpm with 96 char set, and 700 lpm with 64 char set; both come with or without a programmable carrier
 6316 Hungary; VT-24112; 253 or 365 lpm; 80 char/line; 64 or 96 char set
 6321 Hungary; VT-25150; 650 lpm; 132 char/line; 64 or 96 char set
 6322 Romania; RSD-9233; 200 lpm; 132 char/line; 64 or 96 char set

PLOTTING EQUIPMENT: 64XX

6402 Semiautomatic plotting board; 850 x 600 mm working field
 6402.1 Same as 6402 but with a different interface
 6403 USSR; electrostatic graphics printer; 4 points/mm

DATA PREPARATION STATIONS: 69XX

6900 GDR; programmable data entry device; microP based; four models consisting of various I/O devices
 6901 Bulgaria; floppy disk data entry station; keyboard input; CRT display
 6902 GDR; mag tape data acquisition & conversion station; cassette tape drive at 500 B/s xfer rate; standard 9 trk drive at 10 kB/s xfer rate
 6903 GDR; mark sensor; reads marks on forms; 4,000 forms/hour
 6905 Hungary; data preparation terminal; consists of VT 5300 ctrl, MOMFLEX 3200 dual floppy disks, 1 or 2 VSD 47703 displays, VT 600/1200 modem, & one VT 23000 or DZM 180 printer
 6907 GDR; office processor
 6908 GDR; office processor
 6921 CSSR; floppy disk data entry station; keyboard input; CRT display

TERMINALS: 7XXXHARDCOPY TERMINALS: 71XX

7102 GDR; Robotron 1154; sequential alphanumeric printer with keyboard; 45 char/s; 132 char/line; 94 char set
 7103 Poland; alphanumeric dot-matrix printer; 7 x 7 dots/char; 180 char/s; 132 to 158 char/line; 96 char set

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- 7108 CSSR; Consul 2113 sequential printer with Consul 256 keyboard; 5 x 7 dots/char; 150 char/s; 132 char/line; 96 char set
7108.7 CSSR; 80 char/s; 132 char/line; 64 or 96 char set; 100, 200, or 300 b/s xfer rate; duplex; async

ALPHANUMERIC VIDEO TERMINALS: 72XX

- 7202 CSSR; 24 lines; 80 char/line; 5 x 7 dots/char; 96 char set
7203 Cuba; SID-702; 1440 char/screen; 5 x 7 dots/char
7204 USSR; alphanumeric video terminal; 24 lines; 80 char/line; 5 x 7 dots/char
7205 Hungary; Videoton 340; alphanumeric video terminal
7206 CSSR, Hungary; VT-47100 (same as ES-7168); 24 lines; 80 char/line; 128 char set; 5 x 7 dots/char
7207 Poland; 512 char/screen; 5 x 7 dots/char
7208 Poland; 1280 char/screen; 5 x 7 dots/char
7209 Poland; MERA-7952; 1,920 char/screen; 5 x 7 dots/char
7215 Poland c.1986; color monitor
7219 Hungary; VDT-52105; 1,920 char/screen; 7 x 8 dots/char

GRAPHIC DISPLAY TERMINALS: 73XX

- 7300 USSR; EPG-SM; 1024 x 1024 points/screen; vector scan
7301 Hungary; VT-47607; 24 lines; 80 char/line; 125 char set; 512 x 236 points/screen
7316 Video terminal; 340 by 340 mm

INTELLIGENT ALPHANUMERIC VIDEO TERMINALS: 74XX

- 7401 Hungary; VT-47605; programmable video terminal; 25 lines; 80 char/line; 9 x 7 dots/char; 2.4 kB/s xfer rate
7402 GDR; Robotron 4000; 256 char/screen; 5 x 7 dots/char
7404 1024x1024 vector graphic intelligent terminal w/SM-2301 processor

KEYBOARDS: 76XX

- 7601 CSSR; contactless (Hall effect) alphanumeric keyboard; 78 keys; up to 20 char/s typing speed
7953 Poland; video terminal and printer

DATA COMMUNICATION EQUIPMENT: 8XXX

- 8002 CSSR; Modem 200; up to 300 b/s; sync or async; half or full duplex; FM
8006 CSSR; Modem 1200; 75 b/s incoming; 600 or 1200 b/s outgoing; sync or async; half or full duplex; FM
8101 Modem 200; full duplex; async; up to 300 b/s xfer rate; for use over telephone network
8102 Modem 1200; half or full duplex; sync or async; 600 or 1200 b/s xfer rate; for use over telephone network
8103 Modem 2400; half or full duplex; sync; 1200 or 2400 b/s xfer rate; for use over telephone network
8105 CSSR; "null modem;" used to connect local data comms devices to a ctl computer complex; up to 48kb/s xfer rate; async; half or full duplex
8501 CSSR; remote comms adapter; 1-8 chns; 50, 100, 200, 300, 600, 1200, 2400, 4800, and 9600 b/s selectable xfer rate; simplex, half or full duplex; async
8502 USSR; connects comms device with processor; half or full duplex; async;

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3 models with different speeds up to 9600 b/s xfer rate
8505 USSR; data transmission device; 4 channels; up to 20k b/s; sync;
half duplex
8506 CSSR; synchronous adapter for SM-3 & SM-4; up to 9600 b/s xfer rate;
simplex, half, or full duplex
8511 CSSR; asynchronous multiplexer
8512 19.2 kb/s
8606 Synchronized adapter for inter-computer connections

DEVICE INTERFACES: 9XXX

9004 CSSR; passive ctrl connecting DASIO-600 device to SM-3 or SM-4;
250k words/s xfer rate
9101 CSSR; device coupler for SM-1
9104 USSR; device coupler for SM-3 & SM-4; 19 models
9105 Hungary; process terminal; 1K RAM & 3K ROM capacity; Intel 8080 based
9201 USSR; analog, digital, & continuous frequency signal I/O interface
to SM-1 & SM-2; A/D converter
9205 CSSR; laboratory device coupler for SM-3 and SM-4; A/D & D/A converters
9402 CSSR; input & display module; half duplex; async; 200, 600, & 1200 b/s
xfer rate

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APPENDIX

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Typical Ryad-1 and Ryad-1M System Configurations

Ryad Model	1020-a-	1021	1022	1030	1032	1033	1040	1050
Processor	2020.....1-b-2021.....1	2622.....1	2030.....1	2032.....1	2433.....1	2040.....1	2050.....1	
Internal Storage	3220.....1	3221.....1	3222.....1	3203.....1	3203.....1 (3207)	3204.....1	3205.....2	
Channels	in processor	in processor	4430.....1	4430.....1	4011.....1 4035.....1	(4011) 4012.....1 4034.....1	4012.....1 4035.....2 4060.....1	4012.....1 4035.....2 4060.....1
Magnetic Tape Drive	5010.....4	5022..... (5012,5025)-c-	5017.03..4	5010.....4 (5012,5017)	5019.....4 (5017)	5017.03..4	5016.....	5010.....8 (5017)
Magnetic Disk Drive	5056.....2	5058.....2 (5061)	5056.....2	5056.....2	5052.....4 (5061)	5061.....2	5052.....	5050.....5
Mag. Tape Controller	5511.....1	5515.....1 (5525)	5517.....1	5511.....1 (5517,5525)	5519.....1 (5517)	5517.....1	5521.....1	5511.....1 (5517)
Mag. Disk Controller	5551.....1	5558.....1 (5561)	5568.....1	5551.....1 (5561)	5552.....1 (5561)	5568.....1 (5555)	5552.....1	5551.....1
Input channels:								
Card reader	6012.....1	6016.....1	6019.....1 (6015)	6012.....1	6016.....2	6019.....1 (6015)	6012.....1 (6016)	6012.....2 (6013)
Paper tape	6022.....1		6022.....1	6022.....1	6022.....1	6022.....1	6122.....1	6022.....2
Output channels:								
Card punch	7010.....1	7014.....1	7010.....1	7010.....1	7014.....1	7010.....1	7010.....1	7010.....2
Tape punch	7022.....1		7022.....1	7022.....1	7024.....1	7022.....1	7024.....1	7022.....2
Line printer	7030.....1	7034.....1	7032.....1	7030.....1	7033.....2	7032.....1 (7033 7037)	7031.....1	7032.....2
Serial prntr	7070.....1	7071.....1	7077.....1	7070.....1	7076.....1	7077.....1	7070.....1	7070.....2
Data preparation devices:								
Card punch	9010.....2		9011.01..2	9010.....2 (9011)		9011.01..1 (9012)		9010.....1
Tape punch	9020.....2		9024.....2	9020.....2		9024.....1		9020.....1

-a-. Ryad or ES equipment designator
 -b-. Number of units in a typical Ryad system
 -c-. () = Common alternate equipment

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Peripheral Equipment Associated with Ryad-2 Computer Systems

Ryad Model	1015-a-	1025	1035	1045	1055	1060	1065
Magnetic Tape Drive	5017...3-b-	5004...6	5017...6	5017...6	5017...8	5017...8 (5025)	5025...8
Magnetic Disk Drive	5061...3	5061...2 (5066)-c-	5061...3 (5052)	5061...4 (5066)	5061...8 (5066)	5066...6 (5061)	5066...8
Tape storage controller	5517...1	5503...1	5517...1	5517...1 (5519)	5517...1	5517...2 (5525,5568)	5517...2
Disk storage Controller	--	5569...1	5561...1	5561...1	5561...1	5566...2	5566...2
Card reader	6016...1	6016...2	6012...1	6012...2	6016...1	6019...2 (6016)	6019...2
Paper tape reader			6022...1	6022...1	6022...1	6022...2	6022...2
Card puncher	7014...1	7014...2	7010...1	7010...1 (7012 7014)	7014...1	7010...2 (7012)	7010...2
Paper tape punch			7022...1	7022...1 (7024)	7022...1	7022...2	7022...2
Printers	7184...1	7034...2 (7039)	7032...1	7032...2	7033...1	7033...2	7033...2
Video displays							7064...2
I/O Systems		7902...2				7906...1	7906...1

-a-. Ryad or ES equipment designator
 -b-. Number of units in a typical Ryad system
 -c-. () = Common alternate equipment

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Technical Specifications for Soviet Ryad-2 Mainframe Computers

Model	ES-1025	ES-1035	ES-1045	ES-1055	ES-1060	ES-1061	ES-1065
Country	Czech SSR	USSR/Bulgaria	USSR	GDR	USSR	USSR	USSR
Processor							
Speed (1,000 operations/second)	35	160	650	450	1,000	2,000	3,000
Fixed add time (us)	5-13	4.5	0.7-0.85	0.6-2.7	0.25-0.30	*	0.12
Fixed multiply time (us)	95-220	23	2.8-3.4	3.4-5.2	1.5-1.8	*	0.6
Floating point add time (us)	50.0	95.0	1.9	1.6	0.80	*	0.24
Floating point multiply time (us)	9.7	19.8	2.8	2.7	2.3	*	0.30
Main memory							
Capacity (Mbytes)	0.1-0.5	0.25-1	1-4	0.25-4	0.5-8	1-8	2-16
Cycle time (ns)	1,250	800	840	1,140	800	*	*
Access time (ns)	500	550	650	*	*	*	870
Bytes fetched per cycle	8	8	8	8	8	*	*
Microprogram control memory							
Capacity (Kbytes)	*	48 RW	7R0 + 1RW	8	48	*	*
Cycle time (ns)	380	200	120-380	135	*	*	*
Access time (ns)	*	*	*	140	65	*	*
Length of word accessed (bytes)	*	*	8	8	16	*	*
Cache (scratch pad) memory							
Capacity (Kbytes)	X	X	8	X	8	*	32
Cycle time (ns)	X	X	120	X	135	*	*
Access time	X	X	72	X	65	*	*
Length of word accessed (bytes)	X	X	8	X	8	*	*
Channels							
Maximum number	2	5	6	5	7	8	*
Total transfer rate (kbytes/s)	*	1,200	5,000	6,000	9,000	*	15,000
Selector channels							
Maximum number	1	4	(5)	(4)	(6)	*	(16)
Transfer rate (kbytes/s)	33	740	(1,500)	(1,500)	(1,300)	*	(1,500)
Byte-multiplex channels							
Maximum number	1	1	2	2	2	*	*
Transfer rate (kbytes/s)	24	40-280**	40-160**	40-1,500**	110-670**	*	110-?
Block-multiplex channels							
Maximum number	X	X	5	4	6	*	*
Transfer rate (kbytes/s)	X	X	1,500	500-3,000**	*	*	3,000
Class, per State Standard GOST 16325-76	II	III	III	IV	V	V	V

X - Equipment not available on model; RW - read/write; RO - read only

() - On these models the block-multiplex channel can be operated as a selector channel.

* - Data not available.

** - Speed varies depending on numbers and types of operational channels in system.

us = microsecond = 10**(-6) second; ns = nanosecond = 10**(-9) second.

Byte = 8 bits (8 binary digits); Kbyte = 1,024 bytes; kbytes = 1,000 bytes; Mbytes = 1,048,576 bytes.

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Typical SM-3 and SM-4 -a- System Configurations

	Equipment Designators -b-	
	SM-3	SM-4
Timer	2001	2001
Processor	2103	2104
Core main memory	3100 (3101,3102)	3100 (3101,3102)
Semiconductor main memory	3510	3510
Interface expander	4101 (4104)	4101 (4104)
Magnetic cassette tape unit	5208	5208
9-track magnetic tape drive	5301	5301
Removable cassette disk drive	5400	5400
Magnetic disk drive	5402	5402
Floppy disk systems	5603 (5615,5616)	5603 (5615,5616)
General-purpose controller	6001 (6002)	6001 (6002)
Paper tape I/O	6201 (6202)	6201 (6202)
Alphanumeric printer	6300 (6304,6305)	6300 (6302,6304,6305)
Alphanumeric video terminal	7204 (7205)	7204 (7205)

-a- SM-1 and SM-2 system configurations have not been noted using SM equipment designators.

-b- Parenthetical numbers represent alternate equipment.

Technical Specifications for Soviet SM-1 Small Computers -a-

<u>Characteristic</u>	<u>SM-1</u>	<u>SM-2</u>	<u>SM-3</u>	<u>SM-4</u>	<u>SM-5</u>
Speed in kOPS	130	155	135	215	400
Main memory, KW	4-32	32-128	16-28	16-124	128-2,097
Instruction time in microseconds					
Fixed point:					
Addition	2.5	2.2	5	1.2	- -c-
Multiplication	36.6-b-	10	16-d-	10.8	-
Division	-	17	19.5-d-	12.7	-
Floating point:					
Addition	33-b-	18-40	320-d-	28.7	-
Multiplication	110-b-	23	410-d-	34	-
Division	-	40	-	52	-

-a- Information in this table was obtained from Soviet open literature; the SM-5 also has been identified with the SM-2 family in a Soviet export brochure, circa 1983.

-b- Possibly implemented in software.

-c- Dash = not known.

-d- Implemented in software.

GLOSSARY OF ABBREVIATIONS

A/D = Analog to Digital
A/N = Alphanumeric
ALU = Arithmetic and Logic Unit
async = asynchronous
avg = average
b = binary digit = bit
b/mm = bits per millimeter
b/s = bits per second
blk = block
bpi = bits per inch
B = Byte = 8 bits
char = character
chn = channel
cm/s = centimeter per second
CMOS = Complimentary Metal Oxide Semiconductor
cols = Columns
comms = communications
CRT = Cathode Ray Tube
CSSR = Czechoslovakian Soviet Socialist Republic
ctl = control
ctrl = controller
D/A = Digital to Analog
DEDSEC = Double-error detection, single-error correction
ECL = Emitter-Coupled Logic
ES = Edinaya Sistema = Unified System; often transliterated as YeS
FM = Frequency Modulation
GDR = German Democratic Republic
Hz = Hertz = cycles per second
I/O = input output
inst = instruction
ips = inches per second
IRPR = standard Soviet interface, expansion unknown
IRPS = standard Soviet interface, expansion unknown
k = 1,000
K = 1,024
KW = kiloword = 1024 words
kOPS = 1,000 operations per second
lpm = lines per minute
M = Mega = (1,024)(1,024) = 1,048,576; Mb = magabits; MB = megabytes
mag = magnetic
ms = millisecond
m/s = meters per second
microC = microcomputer
microP = microprocessor
miniC = minicomputer
mm = millimeters
MOPS = millions of operations per second
mux = multiplexor
nMOS = negative-channel Metal Oxide Semiconductor

NRZI = Non-Return to Zero Inverted
ns = nanosecond
PE = Phase Encoded
PM = Phase Modulation
RAM = Random Access Memory
ROM = Read Only Memory
Ryad = Series; equivalent to ES
rpm = revolution per minute
s = second
SM = Sistema Malykh = system of small computers
sync = synchronous
tpi = tracks per inch
trk(s) = track(s)
TTL = Transistor-Transistor Logic
upgm = microprogrammable
us = microsecond
VS = Virtual Storage
word = 16 data bits per SM word; 32 data bits per Ryad word except
for Hungarian models which also have 16 data bits per word
w/ = with
xfer = transfer
xpan = expanded
" = inches
? = entry immediately preceding is uncertain

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